

1 WHAT IS CLAIMED IS:

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3 1. Apparatus for removing underwater debris from a reservoir for a golf course  
4 recirculating irrigation system by entraining said debris in water and pumping said entrained  
5 debris out of said reservoir, comprising:

6 eductor means for vacuuming said debris out of said reservoir, said eductor  
7 means including a high pressure water inlet, a vacuum line inlet and an outlet,

8 said vacuum line having a first end connected to said eductor means, said  
9 vacuum line having a second end movable in said reservoir,

10 pump means for driving said eductor means, said pump means having an inlet  
11 line connected to a source of water, and said pump means having an outlet line connected  
12 to said eductor means to deliver high pressure water to said eductor means, whereby said  
13 second end of said vacuum line is adapted to remove said debris from said reservoir  
14 entrained in water from said reservoir, and is adapted to carry said entrained debris to said  
15 eductor means, and

16 separation means for separating said entrained debris from the water in which  
17 said debris is entrained as said entrained debris is discharged from the outlet of said eductor  
18 means.

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20 2. The apparatus of claim 1 wherein said separation means comprises a temporary,  
21 permeable dam through which water passes freely but which traps and separates said debris  
22 from the water in which it was entrained.

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24 3. The apparatus of claim 2 wherein said permeable dam is enclosed.

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1           4.     The apparatus of claim 1 wherein said separation means comprises two  
2 concentric, permeable dams.

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4           5.     The apparatus of claim 2 wherein said permeable dam comprises  
5 a plurality of steel stakes driven into the ground,  
6 a layer of open mesh plastic attached to said stakes, and  
7 a layer of fine mesh fabric adjacent said layer of open mesh plastic.

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9           6.     The apparatus of claim 1 wherein said separation means comprises a  
10 prefabricated, plastic cylinder, said cylinder having a plurality of drain holes formed therein,  
11 and a fine mesh filter covering said plurality of drain holes.

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13          7.     The apparatus of claim 1 wherein said separation means comprises:  
14 a trailer,  
15 a permeable dam carried by said trailer for separating said debris from the water  
16 in which it is entrained.

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18          8.     The apparatus of claim 7 wherein said permeable dam extends across the back  
19 of said trailer.

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21          9.     The apparatus of claim 7 wherein said permeable dam is carried on the bed of  
22 said trailer.

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24          10.    The apparatus of claim 1 wherein said separation means comprises:  
25 a dump truck,  
26 a permeable dam carried by the bed of said dump truck.

1           11.    The apparatus of claim 10 wherein said permeable dam extends across the back  
2 of the bed of said dump truck.

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4           12.    The apparatus of claim 10 wherein said permeable dam is carried on the bed  
5 of said dump truck.

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7           13.    The apparatus of claim 1 wherein said separation means comprises:  
8                a conveyor,  
9                a plurality of permeable members carried by said conveyor.

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11          14.    The apparatus of claim 13 wherein said conveyor is domed along its longitudinal  
12 center.

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14          15.    The apparatus of claim 1 further comprising:  
15                a clean out carried by said eductor means adapted to allow a user to readily  
16 clear a clog in said eductor means.

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18          16.    The apparatus of claim 1 wherein said eductor means further comprises a  
19 conical mixing chamber, a cover for said mixing chamber, a nozzle slidably carried by said  
20 cover, and means for adjusting the position of said nozzle in said mixing chamber.

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22          17.    The apparatus of claim 1 wherein said eductor means has an outlet and a  
23 priming flap carried by said outlet.

1        18.    The apparatus of claim 1 further comprising:  
2                injector means connected to said vacuum line to inject water into said vacuum  
3 line to increase the flow rate of water and entrained debris in said vacuum line.

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5        19.    The apparatus of claim 1 further comprising a collection chamber positioned in  
6 said vacuum line to separate out relatively large pieces of debris that may otherwise clog said  
7 eductor means.

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9        20.    The apparatus of claim 19 wherein said collection chamber comprises:  
10                an elongated, vertically extending body,  
11                a removable cap carried by the top of said body,  
12                a removable separation cage carried inside said body, said cage adapted to trap  
13 large pieces of debris that may otherwise clog said eductor means.

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15        21.    The apparatus of claim 1 wherein said eductor means includes a plurality of  
16 eductors, each having its own separate vacuum line.

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1           22.    Apparatus for removing underwater debris from a reservoir for a recirculating  
2 water system by entraining said debris in water and pumping said entrained debris out of said  
3 reservoir, comprising:

4                   eductor means for vacuuming said debris out of said reservoir, said eductor  
5 means including a high pressure water inlet, a vacuum line inlet and an outlet,

6                   said vacuum line having a first end connected to said eductor means, said  
7 vacuum line having a second end movable in said reservoir,

8                   pump means for driving said eductor means, said pump means having an inlet  
9 line connected to a source of water, and said pump means having an outlet line connected  
10 to said eductor means to deliver high pressure water to said eductor means, whereby said  
11 second end of said vacuum line is adapted to remove said debris from said reservoir  
12 entrained in water from said reservoir, and is adapted to carry said entrained debris to said  
13 eductor means, and

14                   separation means for separating said entrained debris from the water in which  
15 said debris is entrained as said entrained debris is discharged from the outlet of said eductor  
16 means.

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18           23.    The apparatus of claim 22 wherein said separation means comprises a  
19 temporary, permeable dam through which water passes freely but which traps and separates  
20 said debris from the water in which it was entrained.

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22           24.    The apparatus of claim 22 wherein said separation means comprises two  
23 concentric, permeable dams.

1           25.    The apparatus of claim 22 wherein said permeable dam comprises  
2                   a plurality of steel stakes driven into the ground,  
3                   a layer of open mesh plastic attached to said stakes, and  
4                   a layer of fine mesh fabric adjacent said layer of open mesh plastic.  
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6           26.    The apparatus of claim 22 wherein said separation means comprises a  
7 prefabricated, plastic cylinder, said cylinder having a plurality of drain holes formed therein,  
8 and a fine mesh filter covering said plurality of drain holes.  
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10          27.    The apparatus of claim 22 wherein said separation means comprises:  
11                   a trailer,  
12                   a permeable dam carried by said trailer for separating said debris from the water  
13 in which it is entrained.  
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15          28.    The apparatus of claim 22 wherein said separation means comprises:  
16                   a dump truck,  
17                   a permeable dam carried by the bed of said dump truck.  
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19          29.    The apparatus of claim 22 wherein said separation means comprises:  
20                   a conveyor,  
21                   a plurality of permeable members carried by said conveyor.  
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23          30.    The apparatus of claim 22 further comprising:  
24                   a clean out carried by said eductor means adapted to allow a user to readily  
25 clear a clog in said eductor means.  
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1           31.    The apparatus of claim 22 further comprising:  
2                   injector means connected to said vacuum line to inject water into said vacuum  
3 line to increase the flow rate of water and entrained debris in said vacuum line.

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5           32.    The apparatus of claim 22 further comprising a collection chamber positioned  
6 in said vacuum line to separate out relatively large pieces of debris that may otherwise clog  
7 said eductor means.

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9           33.    The apparatus of claim 32 wherein said collection chamber comprises:  
10                   an elongated, vertically extending body,  
11                   a removable cap carried by the top of said body,  
12                   a removable separation cage carried inside said body, said cage adapted to trap  
13 large pieces of debris that may otherwise clog said eductor means.

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15           34.    The apparatus of claim 22 wherein said eductor means includes a plurality of  
16 eductors, each having its own separate vacuum line.

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18           35.    The apparatus of claim 22 wherein said eductor means further comprises a  
19 conical mixing chamber, a cover for said mixing chamber, a nozzle slidably carried by said  
20 cover, and means for adjusting the position of said nozzle in said mixing chamber.

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1           36.    A method for removing debris from a reservoir for a recirculating water system,  
2 wherein an eductor is utilized having a vacuum water line inlet, a high pressure water line inlet  
3 and an outlet, comprising the steps:

4                   driving said eductor by delivering water under high pressure to said high  
5 pressure water line of said eductor,

6                   vacuuming said debris from said reservoir with a vacuum line connected to said  
7 eductor vacuum line inlet by entraining said debris in water from said reservoir and moving  
8 said entrained debris to said eductor,

9                   discharging said entrained debris from said eductor outlet into a separation  
10 chamber,

11                   separating said debris from said water in which said debris is entrained,

12                   collecting said debris in said separation chamber, and

13                   causing said water from which said debris has been separated to flow back into  
14 said reservoir.

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16           37.    The method of claim 36 comprising the further step:

17                   injecting a second source of water under high pressure into said vacuum line.

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19           38.    The method of claim 36 wherein said eductor carries an adjustably mounted  
20 nozzle, comprising the further step:

21                   periodically adjusting the nozzle of said eductor to vacuum different sized debris.